

Application/Control No.: 10/519,954
Examiner: SINGH, ARTI R

REMARKS

The withdrawal of the prior rejections and the entry of new grounds of rejection based in part on newly cited references has been noted. Claim 1 has been amended to correct the syntax of the language and no new matter has been introduced.

In part 3 of the Office Action, claims 1 and 4-27 were rejected under 35 U.S.C. §103(a) as being unpatentable over Fuchs et al. (Fuchs) in view of Cordova et al. (Cordova) further in view of GB 2 349 798 (Plant) or Schuster (U.S. 5,854,143)..

Reconsideration is requested.

The present invention, as defined by claim 1 and the claims that are dependent on claim 1, provides a anti-penetration, flexible ballistic composite material comprising ballistic fibers where at least portion of the ballistic fibers are impregnated or wetted with a polymer in the form of a viscous or visco-elastic liquid and methods for making such a composite material. The improvement in the anti-ballistic behavior is achieved without impairing the flexibility properties of the material. These features are particularly applicable to body armor, which needs to be highly resistant to penetration but flexible enough to permit a full range of movement.

Fuchs discloses a stab resistant material which is based on at least two woven fabrics that are joined together with a discrete layer of a polymer film to form a laminate. There is no mention in Fuchs of impregnated or wetted fibers that are made using a viscous or visco-elastic liquid. Fuchs mentions the use of polymer films which are laminated between woven fabric layers. These structure are exemplified by a polycarbonate polymer which is a solid polymer and not a liquid or visco-elastic polymer. Thus, Fuchs fails to suggest the structure defined by claim 1. In addition, claim 9 of the present application points out an embodiment that is made with a

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thixotropic liquid and this concept is not disclosed or suggested by Fuchs. Process claims 25-27 are also not made obvious by Fuchs because Fuchs does not disclose the making of an anti-penetration composite that is made using a liquid that is applied to ballistic fibers.

The Examiner has urged that in the Fuchs' structure, it would be inherent that the polymer film would have a layer of fabric on each side. The laminate structure of Fuchs is not at issue. The issue is whether or not Fuchs discloses or suggests the use of a viscous or visco-elastic liquid polymer that is used to impregnate or wet the woven layers of a ballistic material. The Fuchs technique for making a laminate where the polymer is pressed between two layers of ballistic fabric does not result in the impregnation or wetting of the woven fiber. This is because the Fuchs technique does not use liquid polymers but relies upon pressing two layers of aramid fabrics onto a layer of polycarbonate (Lexan) at a pressure of 10 bar and at a temperature of 220-230°C as described at pages 5 and 6 of the Fuchs patent. The melting point of Lexan is 440°C and aramid does not melt. Thus the product produced by Fuchs would not inherently have the impregnated or wetted fibers as defined by claim 1.

Cordova discloses an armor system having at least a first cut resistant fibrous layer and a second pliable, impact/ballistic energy absorbing fibrous layer. The Cordova patent does not disclose a structure which is impregnated or wetted with a polymer in the form of a viscous or visco-elastic liquid polymer.

Schuster discloses a material for antiballistic protective clothing which is described as being a flat structure wherein one or more layers of the anti-ballistic package comprise a flat inflexible structure that has been saturated or charged with organic dilatancy agents. The dilatancy agent may be a solid organic compound applied in the form of a dispersion to the flat structure (col. 3, lines 42-55). Liquid polymers as defined in claim 1 are not mentioned or suggested by Schuster. There is no mention of the use of a thixotropic polymer as pointed out in claim 9. The structure thus made is placed as an insert in a jacket or other structure. The making of a

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composite material which is arranged on overlying layers using fibers which are impregnated or wetted with a liquid polymer is not taught by Schuster.

Plant discloses a protective member comprising an envelope encapsulating an energy absorbing material which remains soft and flexible until it is subjected to an impact. The preferred embodiment of the Plant patent is Dow Product 3179 which is also known as silly putty. The Plant invention requires the use of an envelope which confines the energy absorbing material and prevents egress thereof (page 3, line 4). The Plant reference does not teach the impregnation of ballistic fibers with a polymer in the form of a viscous or visco-elastic liquid as pointed out in amended claim 1. In addition, Plant does not mention the use of a thixotropic liquid as pointed out in claim 9.

The protective member of the Plant reference is not a ballistic material but merely a device for absorbing the energy used in conjunction with other protective means such as those illustrated in Figs. 3 to 10 for making Active Protection Systems (page 6) sold to motorcyclists. These systems (Dianese) are unsuitable for ballistic purposes. A projectile can easily pass through the protective member disclosed by the Plant.

The use of the polymer in the form of a viscous or visco-elastic liquid, as recited in amended claim 1, results in improved ballistic performance of an anti-ballistic structure without impairing the flexibility of the composite material. This concept is not disclosed or made obvious by the Plant reference.

In order to demonstrate that it would be obvious to pick and choose from the diverse teachings of the cited references, there would have to be some reason, other than the applicant's specification, to combine the references of record. In the case of Fuchs, that reference makes a laminate and does not impregnate or wet any fabrics. Cordova does not disclose a structure which is impregnated or wetted with a polymer in the form of a viscous or visco-elastic liquid polymer and thus there is no reason to

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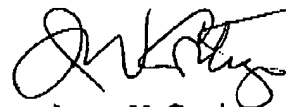
extract any teaching from Cordova and combine such teaching with any of the other references.

The Plant patent only discloses that the polymer is to be isolated in a discrete compartment which is a structure that does not suggest the use of any polymer as a impregnating or wetting agent for fibers for use in an anti-penetration ballistic composite material. The Plant reference is not directed to using the ballistic fibers wetted with a polymer in the form of a viscous or viscous elastic liquid to achieve a ballistic performance enhancement of an anti-ballistic structure without impairing its flexibility.

The Examiner has mentioned that the claimed properties of viscosity would be inherent if not obvious from the cited references. It is not seen which materials that are disclosed in the cited references are viscous or visco-elastic polymers used as impregnating or wetting polymers that have the properties pointed out in claims 4-6, 8, 9 and 12-15. For these reasons, it is requested that this ground of rejection be withdrawn.

An early and favorable action is earnestly solicited.

Respectfully Submitted,



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